Motor Vehicle EDRs and Crash Data

Event Data Recorder Toptec

Alexandria, VA ◆ June 5, 2003

Susan A. Ferguson

INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

Recommended EDR data elements

- 5 seconds prior to crash
  - Belt use
  - Throttle position
  - Whether driver was braking, and whether antilock or electronic stability control features were activated
  - Vehicle speed

Recommended EDR data elements

- During the crash
  - Longitudinal and lateral vehicle acceleration (1,000 data points/second)
  - Delta V by time (100 data points/second)
  - Delta V and delta T for the crash event, if delta V by time is not feasible
  - Time of airbag deployment (including time of different stages of deployment)

EDRs can provide useful information to understand vehicle performance and injury mechanisms in crashes

- Crash severity
- Airbag performance
- Seat belt use
- Injury mechanisms

EDR usefulness in crash investigations

Crash severity

- Estimated delta V currently is only a partial measure of crash severity
  - No information is available on delta T
- Two crashes with the same delta V can differ quite a lot in terms of severity if delta T differs
  - A crash into the soft rear end of a vehicle will be much less severe than into a rigid barrier
- It's not possible to estimate delta V in certain crashes, e.g. underride, override

Estimated delta V is only a partial measure of crash severity

1991 Dodge Caravan struck rear of 1958 Chevrolet Bel Air
Estimated delta V 45 mph

1958 Chevrolet Bel Air
50 inches of crush

1993 Ford Tempo collided with a pole
Estimated delta V 39 mph

Front underride with initial engagement

2001 Honda Accord struck rear of Geo Storm

EDR usefulness in crash investigations

Seat belt use

- Seat belt use can be difficult to assess in some crashes
- Based on investigators judgment or self-report
  - Investigators can examine evidence e.g. D-ring scuffing or belt web striations, but such evidence not available in low speed crashes
  - Because of reduced force on seat belts with airbags such evidence may not be as often available
  - Belt use estimates in NASS/CDS are inflated

EDR usefulness in crash investigations

Airbag deployment data

- Airbag deployment data are critical in understanding airbag performance
- Timing of airbag deployment
  - Airbags can deploy late in some crash circumstances, which will affect possible injury mechanisms
- Multi-stage inflators
  - Investigators will need to know which stage/s deployed to judge whether airbag is doing its job

EDR usefulness in crash investigations

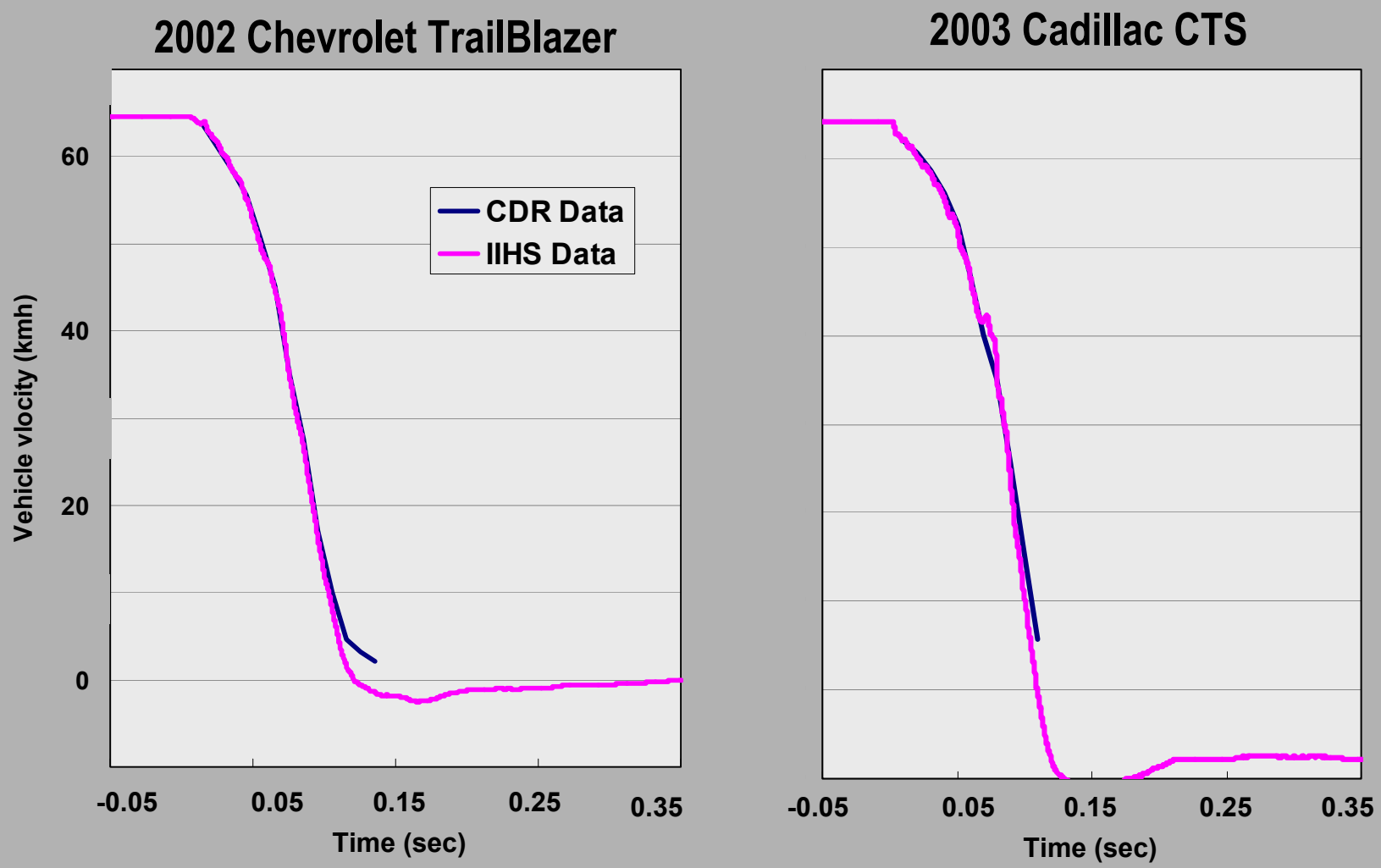
Understanding injury

- Better correlation of crash severity with injury onset and injury severity
  - For example at what delta V does whiplash occur for passenger vehicle occupants in rear impacts

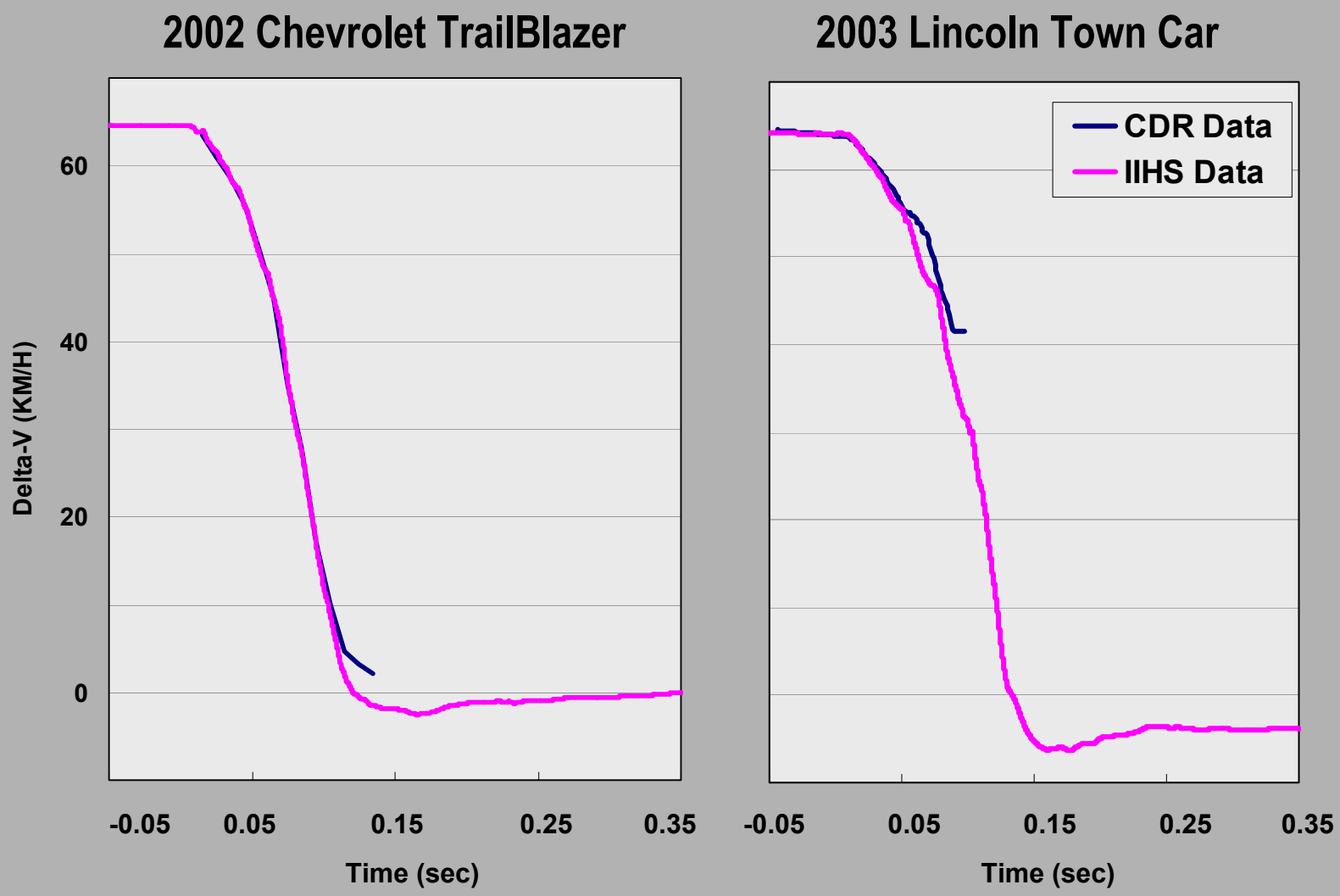
EDR limitations

- Information may be available only for frontal crashes
- Access to the EDR unit not always easy in crash investigations
- Need standard methods to download and interpret information
- EDR data not infallible
  - Need to look at other available evidence from the investigation to be sure it makes sense

Vehicle velocities over time before and after a crash using crash test data



Vehicle velocity over time before and after a crash using crash test data



Summary

- EDRs can be very useful to crash investigators and researchers in understanding vehicle crashworthiness, and potential for crash avoidance
- Currently, limited EDR information available in most vehicles
- Ease of access and use will maximize usefulness to non-traditional users e.g. police departments
- EDR data elements and access should be standardized

For more information:

www.highwaysafety.org

INSURANCE INSTITUTE
FOR HIGHWAY SAFETY